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Plant Health
Inspection
Service

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USDA Wildlife Services Protects People

Protecting People From Predators, Wildlife Conflict and Collisions and Wildlife-Borne Disease

Overview

Wildlife Services (WS), a program within the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, provides Federal leadership and expertise to resolve wildlife conflicts that threaten public health and safety. WS works in every State to reduce wildlife collisions with aircraft and vehicles, and to protect the public from attacks by mountain lions, bears, and other animals. Concern regarding the potential for human illness, caused or carried by wildlife is steadily increasing. Preventing or minimizing the spread of wildlife-borne diseases is of growing importance in the wildlife damage management field.

Protecting People From Predators, Overabundant Populations

As a result of conservation efforts, wildlife populations are thriving across much of the United States, especially in the west. This has led to an increase in encounters between people and predators, such as mountain lion, coyote, and bear, sometimes with life-threatening results.

A man leaves his small-town Louisiana home to find a bear and her cub in his backyard tree, refus-

ing to leave. WS responds with other animal control agencies to trap and relocate the bears. Coyotes accustomed to human presence, perhaps having been intentionally fed, bite suburban residents. A mountain lion in California attacks and severely injures an adult man. In the latter cases, WS expertise is requested by other agencies to locate and lethally remove the animals.

WS specialists are increasingly called upon to locate and capture animals that have attacked people or have been spotted sniffing around residential areas and campgrounds. WS has responded to a growing number of requests to relocate or remove bears causing public safety concerns. WS has both the expertise and the equipment to respond to these threats, and restore public safety. Also, WS has trained other Federal and State agencies how to respond to wildlife attacks on people. Advice is offered to citizens on how to not attract wildlife as well as what can be done to keep wildlife away from populated locations. When required, WS lethally removes wildlife, such as coyotes and wolves, which present a danger to human safety.

From feral hogs on Texas prairies to deer on Pennsylvania mountain roads, wildlife collisions with

motor vehicles can pose a risk to human passengers. When requested by local authorities, WS assists with lethal control to limit the danger to motorists. It also conducts research into contraceptives as a tool to control over-abundant populations.



Protecting Air Passengers

Wildlife collisions with aircraft cost U.S. civil and military aviation more than \$650 million annually and pose a serious safety hazard. Nearly 7,000 wildlife collisions with civil aircraft were reported in FY06, a 17% increase from FY03. An additional 4,000 strikes were reported by military aviation. The rise is attributed in part to increased air traffic and growing populations of birds and other wildlife

These incidents are cataloged in the National Wildlife Strike database maintained by WS for the

Federal Aviation Administration. Since WS began keeping records 16 years ago, more than 75,000 wildlife strikes with civil aviation have been reported.

WS is recognized internationally for its scientific expertise in reducing wildlife hazards at airports and military bases throughout the United States and around the world. Through a balanced effort involving research and wildlife management, WS is reducing the risk to passengers and crews posed by wildlife. Wildlife hazard management assistance was offered at 20 percent more airports and airbases in FY05 than in FY03. WS works at more than half of all U.S. airports certified for passenger traffic in the country. NWRC complements WS field work by conducting research to develop better wildlife damage management techniques and equipment for airports. WS trained 1,739 personnel at 217 airports in wildlife identification and control methods in FY06. (For more details, see the separate report “Protecting Commercial and Military Aircraft and Passengers.”)

Protecting People From Wildlife-Borne Diseases

Increasingly, wildlife diseases, such as West Nile virus (WNV), E. coli, and plague are being transmitted to people, pets, and livestock. The spread of such diseases can be controlled only if integrated with wildlife management. WS plays a crucial role in the area of wildlife disease surveillance, prevention, and eradication.

WS’ National Wildlife Disease Surveillance and Emergency Response Program—The program’s goal is the development and implementation of a nationwide system to survey for wildlife diseases and respond to emergencies including natural disasters and disease outbreaks. Through it WS will assist Federal, Tribal, and State agencies with wildlife disease threats and partner with other APHIS units and Federal agencies. A nationally coordinated wildlife disease surveillance system supports existing programs with sample collection, information exchange, and additional laboratory infrastructure.

In addition to a national coordinator, Wildlife Disease biologists are assigned to 23 WS State offices. They conduct monitoring and surveillance activities and collect biological samples. To maximize efficiency, samples often are obtained in coordination with other WS operations such as protection of livestock, aviation and aquaculture, or in research.

Wildlife disease biologists are available to respond quickly to assist with disease outbreaks and other emergencies requiring WS participation. In an emergency, biologists are required to immediately mobilize and arrive at the emergency site within 48 hours.

WS’ National Wildlife Research Center represents an important component of the program, providing research on disease organisms, their reservoirs, transmission cycles and ways to block transmission.

Highly Pathogenic Avian Influenza (HPAI H5N1)—Avian Influenza has emerged as one of the most-feared animal diseases worldwide, in part due to the potential that the disease possibly could mutate into a virus that could lead to a pandemic. Currently the disease is serious in humans, who contract it through extremely close contact with poultry or other birds. WS participated in a national multi-agency effort for the early detection of highly pathogenic avian influenza in wild birds in North America and several foreign countries, an unprecedented effort by wildlife and natural resource agencies across the country.

In 2006, WS and its partners collected more than 100,000 samples from birds and the environment in every State and flyway, as well as territories and other jurisdictions. There had never been a larger surveillance effort for a wildlife disease in North America and, to date, no highly pathogenic H5N1 avian influenza has been found in North America.

Other diseases—Other diseases of interest include chronic wasting disease (in cervid, or deer-type animals), classical swine fever, brucellosis, pseudorabies, tularemia, bovine tuberculosis and West Nile virus. In addition to the continuing concern regarding HPAI H5N1 in migratory birds, WS anticipates increased interest in the risk that feral hogs pose to humans (brucellosis) and the domestic swine industry.

West Nile Virus (WNV)—First documented in the United States in 1999, WNV is a disease that has enormous potential to impact public health, livestock, and wildlife. Wildlife often serves as a natural host for the virus, which is mainly transmitted to people and animals through mosquito bites. According to the Centers for Disease Control and Prevention (CDC), 47 states currently have reported avian or animal infections from WNV. This represents a significant geographic expansion of the disease from when it was first discovered seven years ago in New York. Also according to the CDC, 348 people have already died from the virus in the United States and over 12,000 people have become ill.

WS worked cooperatively in several States to provide operational and technical assistance related to WNV. In addition to monitoring wildlife populations for disease exposure, WS provided educational assistance and data management for State health agencies. For example, in Alabama, a WS disease biologist coordinates WNV surveillance in wild birds and domestic livestock for the state's public health department providing testing kits to county health departments and maintaining a database. The work includes following surveillance in horses, sentinel chickens, dead birds and mosquitoes for all mosquito-borne viruses, including WNV, Eastern equine encephalitis and St. Louis encephalitis.

Bovine Tuberculosis—Tuberculosis (TB) is a contagious respiratory disease of both animals and humans.

Bovine TB can be transmitted from livestock to people and other animals. Unless eradicated, it will continue to impact human health, animal health, and livestock production. Traditional control strategies have greatly reduced bovine TB in the U.S. but eradication has been complicated due to discovery of bovine TB in a wildlife population: white-tailed deer in Michigan and Minnesota.

WS has been involved in bovine TB eradication in several ways. At Michigan's request, WS employees have depopulated TB-positive captive cervid herds. WS wildlife disease biologists assist in addressing concerns such as testing for the disease in wild deer, removing wild deer that threaten livestock with infection, observing wildlife patterns on farms with TB-positive cattle, providing fencing to farms to exclude deer from feed storage areas to prevent transmission between deer and cattle, and providing assistance in sampling and monitoring the disease.

WS's National Wildlife Research Center has undertaken studies to understand the movement of bovine TB, methods to detect bovine TB, and techniques to prevent transmission between deer and cattle.

Plague—Plague is a bacterial disease not native to North America. It is passed through the bite of fleas. Given advances in medical care and living conditions, plague need not be fatal in humans, although prompt treatment is important. Sylvatic plague, established in the Western U.S., is deadly in rodents, such as prairie dogs, and wildlife

that associates with rodents, such as the endangered black-footed ferret (BFF).

Federal departments have expended substantial resources to revive the BFF. One location showing promise for their resurgence is the Canata Basin, on the northern border of the Pine Ridge Reservation in South Dakota. In early spring 2005 the Tribal Council asked WS to determine whether reported die-offs of prairie dogs were the result of disease or poisoning. WS' collected burrow swabs and carcasses; tests at the Centers for Disease Control confirmed the first verified incidence of sylvatic plague in the State. The relationship between prairie dogs and BFF, and the proximity of the colonies indicated the BFF were in jeopardy.

WS believed a reduction in flea numbers in the prairie dog colony would benefit BFF and through the WS Surveillance and Emergency Response Service was able to mobilize wildlife disease biologists to treat the prairie dog colonies. Working 12 hour days, seven days a week for more than six weeks, WS provided staff and, in nine prairie dog colonies covering 5,000 acres, every burrow was individually treated with four grams of appropriate insecticide.

Whether this preventative treatment will ultimately shield the Canata Basin BFF is unknown. WS personnel and expertise offered some protection to the endangered animal. WS continues, also, to monitor movement of plague. It is working with Tribal representatives on the Tribal lands to address

areas where human health and safety is at risk from plague due to free-roaming pets and field rodents seeking winter refuge near homes.

Working to Remove the Threat of Rabies

Spread through direct contact with an infected mammal, rabies is a fatal disease if not treated. Once associated with dogs (the primary reservoir worldwide), rabies in the U.S. is seen in bats and wild carnivores such as raccoon, coyote and skunk. Rabies-associated costs range from \$300 to \$450 million annually, primarily for pet vaccinations, education, diagnostics, post-exposure treatment and case investigations. The cost is expected to increase if rabies strains are not contained.

To combat its spread, WS has implemented a Cooperative Rabies Management Program, focused on coordinated oral rabies vaccination

(ORV) projects targeting raccoon rabies in 15 Eastern States, canine rabies in Texas, bat-variant rabies in Arizona skunks, and other rabies-related projects. WS collaborates with a variety of organizations to carry out ORV projects in which oral bait, containing the rabies vaccination, is distributed within targeted areas to immunize specific wildlife populations against the disease. ORV is currently the only available technology to strategically contain and eliminate specific strains of rabies in the United States. This innovative program will benefit the American public, livestock producers, pet owners, and wildlife.

In the Eastern United States, WS is focusing on preventing the spread of a raccoon variant of rabies and establishing an ORV barrier along the Appalachian Mountains, which it is hoped will prevent this strain from spreading west. In 2006, the program took an important

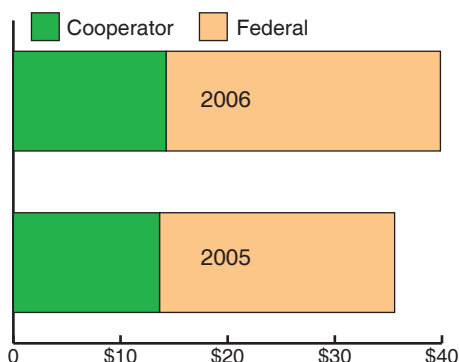
step toward the program goal of eliminating raccoon variant rabies by shifting the Appalachian Ridge vaccination zone five miles to the east in Virginia and West Virginia

For more than 10 years, WS has partnered with Texas groups on an ORV program to prevent a strain of canine rabies from spreading north in coyotes and gray fox. More than 27 million baits have been distributed. WS provides critical expertise to collect blood and tooth samples from coyotes and gray fox to evaluate the program's effectiveness. Reported cases of canine-variant rabies in south Texas dropped from 166 in 1994 to 0 in 2006.

A U.S., Canada and Mexico partnership is underway toward a North American Rabies Management Plan to facilitate closer working relationships on border rabies issues, an important rabies management challenge. *(For more details, see the separate report "National Rabies Management Program Seeks to Control, Eliminate Virus in Raccoons & Other Wildlife.")*



Expenditure for Health & Human Safety (Millions)



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USDA Wildlife Services Protects Property

Protecting Property, Infrastructure and Transportation in Rural to Urban Settings

Overview

Wildlife Services (WS), a program within the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, provides Federal leadership and expertise to resolve wildlife conflicts that threaten public and private resources. WS works in every State to prevent wildlife damage to property, roads and bridges, aircraft, and other important man-made resources.

Protecting Property in Urban and Suburban Areas

Each year, wildlife cost property owners millions of dollars in damage, underscoring the need for responsible wildlife damage management. WS protects homes, lawns, landscaping, golf courses, parks, pets, equipment and machinery, industrial facilities, and other property against wildlife damage.

In fiscal year (FY) 2005, WS conducted more than 14,000 technical assistance projects to reduce wildlife damage to property in urban, suburban, and rural locations as well as at airports across the country. Technical assistance enables property owners to work on their own to resolve wildlife conflicts. WS provides critical information, guidance, and, sometimes, equipment to assist property owners in their



efforts. When the conflict is more significant, however, WS specialists employ direct assistance, using their knowledge and expertise to disperse, remove, or relocate problem wildlife, such as vultures, raccoons, and bears.

WS expended more than \$12.5 million to protect property from wildlife damage in FY05 and \$13.6 million in FY06. Damage may be relatively minor or it may result in significant economic loss and inconvenience. Wildlife can damage foundations, structures, and even internal wiring as it attempts to gain entry into a property. The excrement from

roosting birds or bats is not only foul, but also can corrode machinery and vehicle paint, and can create a slipping hazard on walkways. Hungry wildlife, such as geese, deer and feral pigs, can destroy golf course greens, fruiting plants, lawns, and other landscaped areas.

In addition to causing damage, overabundant wildlife populations can create quite a nuisance. The excrement and noise from a roost of vultures or crows can be so severe that backyard swing sets, grills, lawn furniture, and outdoor business property become useless.

Protecting Infrastructure in Urban and Rural Areas

Roads, bridges, airport runways, dams, water drainage systems, and utilities are also vulnerable to wildlife damage. WS is frequently called upon to relocate or remove wildlife that threaten vital urban and rural infrastructure. Aquatic and burrowing animals, such as beavers, ground hogs, gophers, ground squirrels, and armadillos, often weaken foundations and accelerate erosion damage, causing structures to crack or even collapse. Birds and other wildlife frequently are responsible for electrical power outages that can result in thousands of dollars in damage and lost revenue. Monk parakeets, hawks, and vultures are well known for causing damage to urban infrastructure when they nest, roost, and perch on telephone poles and electrical and communication towers.

Brown tree snakes in Guam regularly cause electrical shortages and power outages that result in more than more than \$1 million in damage. WS engages in a successful damage management program to prevent large scale outages with cost savings of more than \$500,000 annually to the local power authority.

Resolving Beaver Damage—

Beaver, one of the most destructive wildlife species, cause millions of dollars in damage to roads, bridges, dikes and dams, sewer and water treatment facilities, and landscape plants. Many experts believe the cost of beaver damage is greater than that caused by any other U.S. wildlife species. WS personnel across the contiguous States, from Maine to Arizona and from Florida to Washington, respond to beaver



damage reports. In Mississippi and North Carolina, the problem's severity led State agencies to provide major funding for WS to conduct statewide beaver damage management programs. WS also provides large-scale programs in more than a dozen additional States, and responds to individual requests for assistance on a case-by-case basis.

For years, WS has collected beaver damage data reported by private individuals and state agencies; the economic damage caused by beavers in the southeastern United States alone is estimated to have exceeded \$4 billion over a 40-year period. In 1999, WS began collecting data on damage prevented by its management efforts. In FY05, 14 Eastern States sought to quantify how much additional damage was prevented, using very conservative models. In total, WS specialists estimated an additional \$29 million in beaver damage was prevented.

To prevent beaver damage, WS specialists break apart beaver dams that clog water-ways and flood roads and timber resources. Beavers are

removed from areas experiencing high levels of damage. WS has identified multiple research needs relevant to beaver damage management: information on attractants, search dogs, electronic frightening and detection devices, habitat modification, mechanical barriers, "natural/home-made" remedies, non-target concerns, repellants, toxicants, trap development, and basic biology. WS' National Wildlife Research Center (NWRC) is currently conducting research on a number of methods that could be used to prevent beaver damage.

Protecting Transportation

Increased wildlife populations in the last decade have coincided with increasing numbers of wildlife collisions with airplanes, trains, and automobiles. High-speed or mid-air collisions not only result in serious damage, they can be deadly. WS plays a significant role in helping to prevent birds, deer, coyotes, feral hogs, and other wildlife from causing such accidents. Collisions, however, are not the only threat posed to transportation. Rats, mice, and other rodents can also chew through engine wiring, creating potentially dangerous consequences.

Deer Collisions with Automobiles—

As wildlife populations increase and adapt to more urban settings, wildlife-vehicle collisions also increase. Deer are the large wild animal most often involved in such accidents; other wildlife associated with vehicular collisions are elk, antelope, bear, feral hogs and moose.

The United States deer population is at an all time high. Overabundant deer populations, urban and

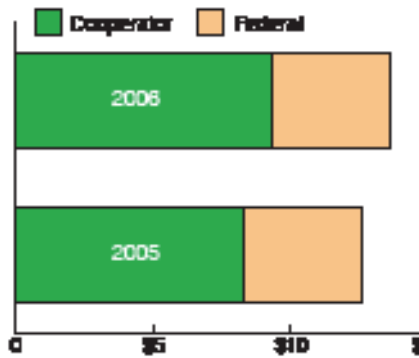
suburban, lead to countless collisions each year. Although difficult to quantify because many accidents go unreported, one study estimates more than 1.5 million deer collisions with vehicles occur annually, resulting in repair costs of more than \$1.1 billion. Auto insurance claim statistics show eight of the top 10 states for the most deer/automobile accidents are east of the Mississippi River. WS works to reduce deer populations in heavily populated areas in order to increase public safety.

WS' research arm, the NWRC, has given high priority to research on the reproductive management of deer. NWRC researchers have successfully tested contraceptive vaccines on white-tailed deer. Research data shows the contraceptive is safe for the vaccinated animals with no associated danger to humans or wildlife eating vaccinated animals. Not intended to replace other management tools, the contraceptive vaccine is a tool for use in conjunction with other management methods. The vaccine can be used to help manage overabundant deer herds in urban and residential areas where other methods, such as hunting, are not always an option.

Wildlife/Aircraft Collisions—

Wildlife can pose a serious threat at airports across the United States. The majority of wildlife strikes are caused by birds, although large mammals are also involved. Through a balanced effort involving research and wildlife management, WS is reducing the incidence of damage to aviation caused by wildlife. WS is recognized interna-

Expenditure for Property Protection (Millions)



tionally for its scientific expertise in reducing such hazards at airports and military bases across the Nation and around the world. Assistance was offered at 20% more airports and air-bases in FY06 than in FY03. WS works at more than half of all U.S. airports certified for passenger traffic. (See the separate report "Protecting Commercial and Military Aircraft and Passengers.")

Wildlife Population and Property Protection

WS conducts research on deer contraceptive vaccines, removes animals in over-populated and strike-probable locations, donating meat as appropriate

- A recent study suggested more than a million collisions annually between vehicles and deer, the large wild animal most often involved in such accidents.
- A recent study estimated the total costs associated with such collisions were \$7,870 for deer, \$17,100 for elk, and \$28,100 for moose. The direct cost of a deer-vehicle strike ranges from \$22,800 per collision in insurance claims
- Pennsylvania, the top ranked state for deer-vehicle collisions, estimates between 12,000 and 40,000 collisions, annually. Numbers are difficult to assess due to the non-reporting of less serious crashes.

WS conducts beaver damage management programs in more than 14 states and researches control of beaver populations and damage.

- A current study suggests for every \$1 spent in managing beaver damage by WS, \$6.30 in resources was saved to roads, bridges, dikes and dams, sewer and water treatment facilities, and landscapes.
- WS currently has 85 trained explosive experts operating in 22 states to handle beaver damage.

WS provided wildlife damage management assistance to approximately 674 airports in FY06.

- Highly successful conservation and environmental programs have resulted in population increases for almost all species of large flocking birds in recent decades. In all, 330 different species of birds have been reported struck by civil aircraft from 1990-2005.
- Wildlife strikes annually cost U.S. civil aviation more than \$550 million and cause more than 500,000 hours of downtime.

USDA Wildlife Services Protects Property

Protecting Commercial and Military Aircraft and Passengers

Overview

Wildlife can pose a serious threat at airports across the United States. While large mammals are responsible for some collisions, the vast majority (98%) of wildlife strikes are caused by birds. Wildlife/aircraft strikes cost the Nation's civil aviation industry about \$550 million per year (1990-2005) and military aviation about \$100 million. At least 195 people died and 170 aircraft were destroyed worldwide as a result of bird strikes with civil and military aircraft from 1988-2006.

Wildlife Services (WS), a program within the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, provides Federal leadership and expertise to resolve wildlife conflicts that threaten public and private resources. WS staffs professional biologists available for consultations and services in all 50 States and is recognized internationally for research and management programs in wildlife damage control.

More Air Traffic, More Wildlife

Although it may seem like a bird could not cause much damage, one Canada goose has the potential to take down a major jetliner, threatening the lives of passengers and destroying the aircraft. In September 1995, the U.S. Air Force lost 24

airmen and a \$190 million AWACS aircraft which collided with Canada geese on takeoff.

In 2005, a Falcon 20 aircraft lost power to both engines after ingesting mourning doves during lift-off, resulting in an aborted take-off in Ohio. Sliding through an airport fence, across a highway, and into a cornfield, the aircraft sustained major structural damage beyond economical repairs. In Virginia, an Airbus 320 was struck by more than 300 European starlings in 2006. Birds were ingested in both engines during the approach for landing and one engine required replacement at a cost of more than \$1.3 million. Mammals, from coyote to deer, can find their way to airport runways. At least 18 civil aircraft have been destroyed by deer strikes in the U.S. since 1983. In total, wildlife collisions cost U.S. civil aviation more than \$550 million annually and 500,000 hours of aircraft downtime.

A combination of expanding populations of many wildlife species that are hazardous to aviation and increasing numbers of aircraft movement contributed to increased wildlife/aircraft strikes in the past 20 years. Populations of North American bird species that pose hazards to aviation have increased dramatically and many have adapted to urban environments. These include Canada



geese, brown pelicans, bald eagles, vultures and cormorants, among others. Commercial aircraft movements have increased at about two percent per year since 1980. Simultaneously, turbofan-powered aircraft currently in use prove quieter than older aircraft, so birds are less able to detect and avoid them.

Consultation and Direct Services Provided

Through a balanced effort involving research and wildlife management, WS is reducing the incidence of wildlife/aircraft strikes on and near airports where most strikes occur. Recognizing the expertise and accountability of WS, the Federal Aviation Administration (FAA) entered into a Memorandum of Understanding (MOU) with WS, which encourages airports to "request technical and operational assistance from Wildlife Services to reduce wildlife hazards." The Department of Defense executed a similar

MOU to address wildlife conflict issues at military installations. In 2006, an MOU between WS and the National Association of State Aviation Officials (NASAO) was signed, fostering cooperation between WS and NASAO in reducing wildlife hazards at airports nationwide.

The number of civil and military airports assisted by WS has steadily grown since the program began working on wildlife damage management at airports in 1990 when 42 airports requested assistance. In 2006, 674 airports sought WS assistance and WS biologists provided 144 staff-years of assistance at airports in every state as well as three U.S. territories and two foreign countries. Of the 575 U.S. airports certificated for passenger traffic (under the FAA's 14 CFR Part 139), WS assisted at 355 airports which served 610 million commercial passengers.

In the U.S., airports initially assess wildlife hazards. Based on the assessment, an airport may need to develop a wildlife hazard management plan to minimize the likelihood of catastrophic or major-damage strikes. WS staff provides those services to airports.

WS currently employs 323 active personnel who have completed training to meet the requirements outlined in FAA Advisory Circular on Qualifications and Training for Airport Biologists.

WS provided direct services, such as population management through disbursement, habitat modification, or wildlife removal, at 278 airports in FY05. Technical assistance, such as initial consultations

and wildlife hazard assessments, was provided at 660 airports.

Training, however, is expected to remain an integral part of WS' airport work. WS provides airport personnel with critical training on identification and management of certain wildlife hazards. In FY06 the training was provided at 217 airports involving 1,739 personnel.

Research Seeks New Methods, Materials

The National Wildlife Research Center (NWRC) complements WS field work by conducting research to develop better wildlife damage management techniques for airports. For example, NWRC scientists are studying the height and type of vegetation to determine how to minimize bird and wildlife populations at and near airports. Other NWRC research resulted in development and commercial marketing of a

hand-held laser for dispersing birds from airport environments.

Recent research indicates that radar can provide information to supplement visual observations by wildlife biologists on airfields. Investigation of this topic and use of small mobile radars, continues. Experimental work continues on the use of colored lighting and avian avoidance behavior with the intent to develop new equipment to reduce bird-strike hazards.

Most significantly, NWRC has developed a 16-year U.S. database containing more than 66,000 records of wildlife strikes between 1990 and 2005. This database provides airports with an objective assessment of the nature and magnitude of wildlife strikes, and provides aircraft and engine manufacturers with critical information to improve aircraft components.

Technical and operational (direct management) assistance provided by USDA Wildlife Services biologists to reduce wildlife hazards at airports, FY 2006.

Category and Type of assistance to reduce wildlife hazards	Number of airports	% of total airports assisted (n = 674)
Technical		
Consultation regarding wildlife issues	650	96
Training of airport personnel	217 ^a	32
Wildlife Hazard Assessment	178	26
Wildlife Hazard Management Plan	121	18
Environmental Assessment	81	12
Total Technical Assistance	660	98
Direct management		
Lethal control of hazardous wildlife	221	33
Non-lethal dispersal of hazardous wildlife	188	28
Habitat modification	145	22
Live-trap/ translocation of wildlife from airport	69	10
Total Direct Management Assistance	271	40

^a Number of airports where training took place; personnel from additional airports attended some of these training courses

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